



## To what extent has climate change contributed to the recent epidemiology of tick-borne diseases?

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### Abstract:

There is no doubt that all vector-borne diseases are very sensitive to climatic conditions. Many such diseases have shown marked increases in both distribution and incidence during the past few decades, just as human-induced climate change is thought to have exceeded random fluctuations. This coincidence has led to the general perception that climate change has driven disease emergence, but climate change is the inevitable backdrop for all recent events, without implying causality. Coincidence and causality can be disentangled using tick-borne encephalitis (TBE) as a test case, based on the excellent long-term data for this medically significant European disease system. Detailed analysis of climate records since 1970 has revealed abrupt temperature increases just prior to the dramatic upsurge in TBE incidence in many parts of central and eastern Europe. Furthermore, the seasonal patterns of this temperature change are such as might have favoured the transmission of TBE virus between co-feeding ticks. Nevertheless, the pattern of climate change is too uniform to explain the marked heterogeneity in the timing and degree of TBE upsurge, for example in different counties within each of the Baltic countries. Recent decreases as well as increases in TBE incidence must also be taken into account. Instead of a single cause, a network of interacting factors, acting synergistically but with differential force in space and time, would generate this epidemiological heterogeneity. From analysis of past and present events, it appears that human behavioural factors have played a more significant role than purely biological enzootic factors, although there is an explicit causal linkage from one to the other. This includes a range of abiotic and biotic environmental factors, together with human behaviour determined by socio-economic conditions. Many of the abrupt changes followed from the shift from planned to market economies with the fall of Soviet rule. Comparisons between eight countries have indeed revealed a remarkable correlation between poverty indicators and the relative degree of upsurge in TBE from 1993. Against this background of longer-term shifts in TBE incidence, sudden spikes in incidence appear to be due to exceptional weather conditions affecting people's behaviour, which have a differential impact depending on socio-economic factors. This new perspective may also help explain the epidemiology of Crimean-Congo haemorrhagic fever around the eastern Mediterranean region, including the current exceptional epidemic in Turkey.

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### Resource Description

#### Exposure :

weather or climate related pathway by which climate change affects health

Ecosystem Changes, Precipitation, Temperature

# Climate Change and Human Health Literature Portal

**Temperature:** Fluctuations

**Geographic Feature:** ☒

resource focuses on specific type of geography

None or Unspecified

**Geographic Location:** ☒

resource focuses on specific location

Non-United States

**Non-United States:** Europe

**European Region/Country:** European Region

**Other European Region:** central; eastern Europe

**Health Impact:** ☒

specification of health effect or disease related to climate change exposure

Infectious Disease

**Infectious Disease:** Vectorborne Disease

**Vectorborne Disease:** Tick-borne Disease

**Tick-borne Disease:** Crimean-Congo Haemorrhagic Fever, Tick-borne Encephalitis

**Mitigation/Adaptation:** ☒

mitigation or adaptation strategy is a focus of resource

Adaptation

**Population of Concern:** A focus of content

**Resource Type:** ☒

format or standard characteristic of resource

Review

**Timescale:** ☒

time period studied

Time Scale Unspecified

**Vulnerability/Impact Assessment:** ☒

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content